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Residential, Commercial, and Industrial Technical Work Group

Policy Option Descriptions

February 23, 2006

Notes:

- Bear in mind that individual options may overlap or interact with each other (and with other RCI subgroup and Energy Supply policies). These overlaps and interactions will be taken into account, to the extent possible, as the process proceeds.
- The draft material below refers in several places to the findings and recommendations of two recent reports.
    - The February 2005 report the Arizona Working Group on Renewable Energy and Energy Efficiency Issues. This report can be found at: http://www.swenergy.org/news/GovernorsRE&EE-ReportF_Feb18.pdf
    - The Energy Efficiency Task Force Report to the Clean and Diversified Energy Advisory Committee of the Western Governors' Association, *The Potential for More Efficient Electricity Use in the Western United States*, December 19, 2005. This report is referred to here as the "WGA CDEAC EE report" and can be found at: http://www.westgov.org/wga/initiatives/cdeac/Energy%20Efficiency.htm. A companion WGA CDEAC report, the *Combined Heat and Power White Paper*, dated January, 2006, is also quite germane to the some of the policy options that follow, as is the *Solar Task Force Report*, also dated January, 2006.
- The Distributed Energy Association of Arizona (DEAA), at the request of TWG member Penny Allee Taylor and her colleague Brian O'Donnell has provided some draft text on options RCI-6 through RCI-8. (The provision of this draft text was offered during a TWG meeting, and the offer was accepted by the TWG.) The draft text has been adapted for use in some passages of the policy descriptions below, as indicated in footnotes.
- Please note that some of the descriptions use an abridged version of the full policy template (e.g. missing outline sections 7-12). The descriptions will all be made fully consistent at a later date.

Residential, Commercial, and Industrial Technical Work Group
List of Priorities for Analysis

#	Policy Name	# From Long List Policy Matrix	Volunteer Groups
	RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL		
RCI-1	Demand-Side Efficiency Goals, Funds, Incentives, and Programs	1.1, 1.2, 1..3, 1.4, with 6.1, 6.2 as Supporting Policies	**Group A:** Rebecca Chavez, Jeff Homer, Amanda Ormond, Jeff Schlegel, Penny Allee Taylor (Brian O'Donnell)
RCI-2	State Leadership Programs	2.1 with 6.1, 6.2 as Supporting Policies	
RCI-3	Appliance Standards	3.1 with 6.1, 6.2 as Supporting Policies	
RCI-4	Building Standards/Codes	4.1 with 4.2, 6.1, 6.2 as Supporting Policies	**Group B:** Jeff Schlegel, Grady Gammage, Glenn McGinnis, Penny Allee Taylor (Brian O'Donnell)
RCI-5	"Beyond Code" Building Design Incentives and Programs	5.1 with 4.2, 6.1, 6.2 as Supporting Policies	
RCI-6	Distributed Generation/Combined Heat and Power	8.1, 8.2, with 6.1, 6.2, 8.3, elements of 10.1 as Supporting Policies	**Group C:** Amanda Ormond (RCI-8), Penny Allee Taylor (Brian O'Donnell)
RCI-7	Distributed Generation/Renewable Energy Applications	9.1, with 6.1, 6.2, 8.3, elements of 10.1 as Supporting Policies	
RCI-8	Electricity Pricing Strategies	10.1, with 8.3 as Supporting Policy	
RCI-9	Mitigating High GWP Gas Emissions (HFC, PFC)	12.1, 12.2, 12.3	**Group D:** Glenn McGinnis, Tim Mohin, Amanda Ormond, Penny Allee Taylor, Richard Tobin, Ken Evans (Kevin Kinsall)
RCI-10	Demand-Side Fuel Switching	13.1	
RCI-11	Industrial Sector GHG Emissions Trading or Commitments	14.1	
	Solid Waste, Wastewater, and Water Us Management	16.1 – 16.5	TBD

Policy Option: RCI-1-- Demand-Side Efficiency Goals, Funds, Incentives, and Programs: *Long List Items 1.1, 1.2, 1.3, 1.4, with 6.1 (Consumer Education) and 6.2 (School Curriculum) as Supporting Policies*

1. Policy Description:

   a) Lay description of proposed policy action: This policy option considers energy savings goals for electricity and natural gas, and the policy, program, and funding mechanisms that might be used to achieve these goals. These are intended to work in tandem with other strategies under consideration by the RCI and ES TWGs.

   Given the numerous options for approaching demand-side efficiency strategies, the TWG recommends approaching this option in three parts:

   - **Goals:** The first step is to establish reasonable goals for efficiency activities. Typically these are expressed either as energy savings targets (MWh or % of load saved per year) or as utility spending targets ($ target or % of annual revenues directly to efficiency programs).
   - **Funding and Implementation Mechanisms:** Several policy options are commonly used to overcome market, administrative, and institutional barriers to cost-effective efficiency improvements.[1] These options can include public benefit charges[2], tariff riders, enabling legislation, and/or regulatory directives. They can also work together with state and national tax incentives for energy efficient equipment.[3] Implementation of efficiency programs can be the direct responsibility of utilities directly and/or can involve the creation of third party organizations, such as Oregon's Energy Trust.
   - **Incorporation of Efficiency in a Planning Context:** Inclusion of energy efficiency resource in an integrated resource planning (IRP) process can enable the overall most efficient and cost-effective delivery of energy services. IRP is currently practiced in Arizona, and is under consideration by the ES TWG.

   In addition, supporting activities may be important elements in the success of energy efficiency strategies. These supporting strategies could include consumer education and outreach programs, and market transformation programs and organizations.[4] (Supporting

[1] For an overview of activity in other states, see USDOE/DSIRE summary tables http://www.dsireusa.org/summarytables/

[2] Public benefit charge funds are in place in about 15 states, typically adopted as part of electricity restructuring policy/legislation. These funds are collected as surcharge on utility bills, and are typically directed to a mix of energy efficiency, renewable energy, and low-income programs.

[3] Currently pending Arizona HB 2843 would provide tax credits for selected energy and water saving products (central air conditioners, air-source heat pumps, and Energy Star clothes washers and ceiling fans).

[4] Market transformation is a relatively new term for energy efficiency programs that focus on voluntary efforts implemented by non-utility organizations to encourage greater uptake by

strategies will be considered as part of overall recommendations, but their impacts will not be quantified.) They could also include decoupling utility sales and revenues and creating performance incentives that reward utilities for implementing effective DSM programs. (See WGA recommendations below)

b) Policy Design Parameters:

i. Implementation level(s) beyond BAU: Subject to TWG approval, the following goals are tentatively suggested:

- Electricity (energy savings target): 5% savings by 2010, 15% savings by 2020
- Natural Gas (utility spending target): ramp up to spending 1.5% of revenues by 2010. (Note that this would represent a doubling of Southwest Gas' DSM funding, from a level of 0.8%, which is expected to be approved shortly. With further decisions to decouple gas sales and revenues, a higher target might be possible. On the other hand, with decoupling, a 1.5% target may be too ambitious.)

Funding and implementation mechanisms have yet to be determined.

ii. Timing of implementation: Further details will depend on funding/implementation mechanism.

iii. Implementing parties: Utilities will certainly be implicated; other parties will depend on how the funding/implementation mechanisms are established.

iv. Other

c) Implementation Mechanism(s): To be determined, per above.

2. <u>BAU Policies/Programs:</u>

a) Arizona utilities (including APS, SRP, TEP and Southwest Gas) operate a number of DSM programs, including audits, new home programs, shade tree programs, appliance rebates, and others. In addition, the Arizona Department of Commerce's Energy Office provides energy efficiency programs for businesses, communities and homeowners in Arizona.

b) In 2004, the Arizona Corporation Commission (ACC) issued a recommended order in a recent Arizona Public Service Co. rate case, supporting a funding level of $16 million per year for APS demand-side management (DSM) programs, an increase from $1 million per year.

c) In 2002, Tucson Electric Power was approved to spend $1 million of System Benefits Charge funding for low income and energy efficiency programs

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consumers (residential, commercial, and industrial, as well as the professionals that service energy-using equipment) of cost-effective energy conservation practices. The Northwest Energy Efficiency Alliance is often cited as a successful example of market transformation organization. http://www.nwalliance.org/

d) Arizona home sellers can subtract five percent (up to $5,000) of the sales price of a single family home or condominium that is 50% more efficient than the 1995 Model Energy Code (MEC) from their income for the purpose of calculating their state income tax. The income tax deduction is available through 2010.

3. Types(s) of GHG Benefit(s): Principally, the reduction in GHG emissions (largely CO_2) from avoided electricity production and avoided on-site fuel combustion. Less significant are the reduction in CH_4 emissions from avoided fuel combustion and avoided pipeline leakage. Other GHG impacts are also conceivable, but are likely to be small (black carbon, N2O) and/or very difficult to estimate (materials use, life cycle, market leakage, etc.).
4. Types of Ancillary Benefits and or Costs, if applicable: The WGA CDEAC EE report cites the following (p.2)
    - "saving consumers and businesses money on their energy bills;
    - reducing dependence on imported fuel sources;
    - reducing vulnerability to energy price spikes;
    - reducing peak demand and improving the utilization of the electricity system;
    - reducing the risk of power shortages;
    - supporting local businesses and stimulating economic development;
    - enabling avoidance of the most controversial energy supply projects;
    - reducing water consumption by power plants; and
    - reducing pollutant emissions by power plants and improving public health."

    The TWG noted a related ancillary benefit, i.e.
    - reducing transmission/distribution system costs

5. Estimated GHG Savings and Costs Per $MMTCO_2e$ and 6) Data Sources, Methods and Assumptions
    - For this and other options below, we will need to coordinate with ES TWG for common assumptions/analysis on fuel prices, avoided electricity costs and emissions.
    - We are aware of no electricity or natural gas efficiency potential studies conducted in Arizona. As a result, estimates of efficiency savings and costs will be based on regional studies and analyses/experience in other states.
    - Utility sectoral/end-use data on electricity consumption patterns (current and projected) and on current and historical DSM programs would improve estimates of efficiency potential.

Additional material for RCI1 consideration:

The **Arizona Working Group on Renewable Energy and Energy Efficiency Issues** provides a number of related recommendations, among them:

- The Governor's staff and the Energy Office should be directed to coordinate and conduct studies to examine methods by which the State can contribute to the proposed WGA

goals, determine a preferred method or methods, identify the actions necessary to make the contributions and identify the economic effects thereof.

- The Governor should encourage expansion of tax credits or other tax incentives, if appropriate, for on-site renewable energy and energy efficiency projects.
- The Group emphasizes the importance of establishing a follow-up Task Force with a mission to increase the use of renewable energy and energy efficiency in Arizona.

The **WGA CDEAC EE report** provides the following policy recommendations (p.x-xii):

Electricity DSM:

- Encourage or require that utilities integrate energy efficiency options into resource planning and procurement decisions and pursue energy efficiency whenever it is the least cost resource option. At a minimum, electricity distribution companies in western states should dedicate at least 2% of revenues for ratepayer-funded energy efficiency programs, as long as doing so is cost effective.
- Establish minimum energy savings requirements or targets. In particular, we recommend setting a goal of saving 3-5% of projected electricity sales in 2010 through DSM programs. By 2020, we recommend setting a goal of 10-15% savings from DSM programs, as long as doing so is cost effective.
- Decouple electricity sales and revenues so that reduced electricity sales do not adversely affect utility revenues, in combination with the creation of performance incentives that reward utilities for implementing effective DSM programs.

Natural Gas DSM:

- "Encourage or require gas utilities to integrate energy efficiency resources into their resource planning and procurement decisions and pursue energy efficiency whenever it is the lowest cost option.
- Establish ratepayer-funded natural gas energy efficiency programs.
- Invest at least 1.5-2% of gas utility revenues in energy efficiency programs and strive to save the equivalent of 0.5-1.0% of gas consumption per year, as long as doing so is cost effective.
- Decouple gas utility sales and revenues and create performance incentives that reward utilities for implementing effective DSM programs."

Market transformation:

- Create additional regional market transformation organizations modeled on the successful Northwest Energy Efficiency Alliance.

Financial Incentives:

- Consider providing income or property tax incentives to help stimulate greater adoption of energy efficiency measures, and consider coordinating qualification levels with the newly adopted federal energy efficiency tax credits.
- For states with growing severance tax revenues on fossil fuels production, consider using a portion of these revenues to offset the revenue loss from tax incentives on energy efficiency measures.

Policy Option: RCI-2-- State Leadership Programs:
Long List Item 2.1 with 6.1, 6.2 as Supporting Policies

1) Policy Description:

a) Lay description of proposed policy action: As noted in a recent USEPA report "State and local governments are implementing a range of programs and policies that advance the use of clean energy within their own facilities, fleets, and operations. These 'Lead by Example' initiatives help state and local governments achieve substantial energy cost savings while promoting the adoption of clean energy technologies by the public and private sectors."[5] With its existing statute requiring energy savings in state buildings, Arizona is already a recognized leader in state leadership policies. (see BAU policies below)

The policy action under consideration here would include extension of the state building energy savings goals through 2020, standards for new state buildings, as well as mechanisms to support the state in achieving its goals. It could also include Green Procurement Strategies, such as efforts to promote or require the purchase of a certain fraction of electricity from renewable sources, and the promotion of new CHP facilities, such as ASU's 8MW facility soon to come on-line.

b) Policy Design Parameters:

Energy Savings Goals: Extend the goals of Statute A.R.S. 34-45 (see below) to include a further 15% reduction in energy use per square foot in state buildings from 2011 to 2020, along with purchasing of EnergyStar equipment.

Standards for New State Buildings: Possible design parameters could recommendations for new buildings to be [X%] better than code or LEED-related requirements, such as those recommended by the Arizona Working Group on Renewable Energy and Energy Efficiency and by the WGA CDEAC EE Task Force:

- "The State should investigate the feasibility of requiring all new State-funded or State-controlled building projects being required to certify to green building standards (e.g. LEED-NC Silver or higher level for new construction).
- The State should investigate the feasibility of requiring over the next five years all existing State-funded or State-controlled buildings to certify to green building standards (e.g. LEED-EB Silver or higher level for existing buildings).
- With respect to the LEED green building standards, the State should investigate the feasibility of requiring each State-funded or State-controlled building project to achieve a minimum of four (4) energy efficiency points and at least two (2) additional points through a combination of on-site renewable energy and off-site green power.

[5] USEPA, 2006. *Clean Energy-Environment Guide to Action,* http://www.epa.gov/cleanenergy/stateandlocal/guidetoaction.htm

- With respect to the LEED green building standards, the State should investigate the feasibility of requiring additional commissioning and measurement & verification efforts to ensure that they are meeting energy targets."
- "Construct new buildings that are exemplary and surpass minimum energy code requirements by a wide margin." (WGA CDEAC EE Task Force)

Supporting Activities and Mechanisms: These could include various activities, including for instance the following recommendations::

- The Governor should use public events, such as installing energy efficiency products in the Governor's residence, or openings of new energy efficient projects, or public awards (energy efficiency or renewable energy awards) to draw attention to the State's renewable energy and energy efficiency ethic. (AZ EE/RE Working Group)
- The Governor and state agencies should promote the use of State and other public facilities as demonstrations of energy efficiency and renewable energy. (AZ EE/RE Working Group)
- Provide financial and technical assistance for implementation of energy savings projects in existing buildings and facilities. (WGA CDEAC EE Task Force)
- Use energy service companies (ESCOs) and performance contracting to implement efficiency projects without public sector capital investment. (WGA CDEAC EE Task Force)

Green Procurement Strategies: These could include various initiatives, including for instance, the following recommendations of the AZ Working Group:

- The Governor and the Department of Administration should establish a program to install renewable energy systems as additional backup services in emergency services buildings (police stations, fire stations, National Guard facilities).
- The Governor should require state buildings – including schools – to purchase, install and operate cost-effective renewable energy equipment or purchase green power to meet 5% of their building energy needs over a phased-in period by 2012.
- The Governor and State agencies should require State offices to buy a percentage of their electricity from renewable resources, if cost-effective.

Promoting CHP (cogeneration) in State Buildings: TBD

i) Implementation level(s) beyond BAU: See above

ii) Timing of implementation: See above

iii) Implementing parties: See above

iv) Other??

c) Implementation Mechanism(s): See above. These could include, among others,

i) Funding mechanisms and incentives

ii) Legislation/statutes

iii) Codes and Standards

iv) Reporting

2) BAU Policies/Programs, if applicable:

a) Statute A.R.S. 34-451 directs state agencies and universities to achieve a 10% reduction in energy use per unit of floor area by 2008, and a 15% reduction by 2011; purchase cost-effective ENERGY STAR or Federal Energy Management Program-designated energy-efficient products; and meet energy conservation standards developed by the Arizona Department of Commerce's Energy Office.

b) Executive Order 2005-05 implementing renewable energy and energy efficiency in new state buildings (http://www.governor.state.az.us/eo/2005_05.pdf)

c) A May 2001 Executive Order directed state agencies and employees to implement energy conservation measures in state facilities.

d) Solar Design Standards for State Buildings.

3) Types(s) of GHG Benefit(s): To the extent state actions are focused on reducing electricity purchases or increasing renewable energy production, GHG impacts are likely to be similar to those described for RCI1 above.

4) Types of Ancillary Benefits and or Costs, if applicable: To the extent state actions are focused on reducing electricity purchases or increasing renewable energy production, ancillary impacts are likely to be similar to those described for RCI1 above.

5) Estimated GHG Savings and Costs Per MMTCO$_2$e and 6) Data Sources, Methods and Assumptions: Not yet considered.

Policy Option: RCI-3 - Appliance Standards: *Long List Item 3.1 with 6.1, 6.2 as Supporting Policies*

1) Policy Description:

   a) Lay description of proposed policy action: Appliance efficiency standards reduce the market cost of energy efficiency improvements by incorporating technological advances into base appliance models, thereby creating economies of scale. Appliance efficiency standards can be implemented at the state level for appliances not covered by federal standards. Arizona, along with several other states, recently adopted state level appliance efficiency standards covering several appliances (commercial ice makers, commercial clothes washers, pre-rinse spray valves, commercial refrigerators and freezers, exit signs, large packaged air conditioners, distribution transformers, metal halide lamp fixtures, power supplies, torchieres, traffic signals, and unit heaters). State actions led the Federal government to adopt rule-making for these appliances in the 2005 energy bill. California has established standards for a number of appliances not covered by Arizona or national legislation, such as pool pumps, consumer electronics (stand-by power use), and general-service incandescent lamps.

      The specific policy approach suggested by the TWG is to:
      - First, advocate for stronger federal appliance efficiency standards where this is technically feasible and economically justified.
      - Second, for those appliances not likely to be covered by federal efforts, pursue efficiency standards already adopted by California.

   b) Policy Design Parameters:

      i) Implementation level(s) beyond BAU: Per above.

      ii) Timing of implementation: TBD.

      iii) Implementing parties: TBD

      iv) Other

   c) Implementation Mechanism(s):

      i) Codes and standards

2) BAU Policies/Programs, if applicable:

   a) Arizona Appliance Efficiency Standards [HB2390]

   b) Existing Federal Appliance Efficiency Standards [2005 Energy Bill]

3) Types(s) of GHG Benefit(s): GHG impacts are similar in nature to Efficiency (RCI1) above.

4) Types of Ancillary Benefits and or Costs, if applicable: Ancillary impacts are similar in nature to those noted for Efficiency (RCI1) above.

5) Estimated GHG Savings and Costs Per MMTCO$_2$e and 6) Data Sources, Methods and Assumptions

- Data are available from California Energy Commission on costs and benefits of their appliance standards. Appliance Standards Analysis Project has some estimates of appliance sales by state.

Policy Option: RCI-4 -- Building Standards/Codes: *Long List Item 4.1 with 4.2, 6.1, 6.2 as Supporting Policies*

1. Policy Description:

   a) Lay description of proposed policy action:

   Building energy codes specify minimum energy efficiency requirements for new buildings or for existing buildings undergoing a major renovation. Given the rate of population growth in Arizona and the long lifetime of buildings, current and future building codes will have considerable impact future energy use in buildings, and on related greenhouse gas emissions. It is recommended that Arizona take the following actions in order to realize the energy savings and other benefits offered by state-of-the-art building energy codes[6]:

   - Arizona should either establish a statewide mandatory code or strongly encourage local jurisdictions to adopt and maintain state-of-the-art codes.
   - Arizona and/or local jurisdictions should adopt the 2004 International Energy Conservation Code (IECC), to the extent that adoption has not already occurred. Also, Arizona and/or local jurisdictions should consider adopting innovative features of California's latest Title 24 building energy codes, such as lighting efficiency requirements in new homes.
   - Arizona and local jurisdictions should update energy codes regularly. A three-year cycle could be timed to coincide with release of the national model codes.
   - Revised building codes for Arizona as a whole and for local jurisdictions should be prepared with the involvement of local chapters of code organizations to assist in obtaining support for and compliance with the new policies.

   b) Policy Design Parameters:

   In fleshing out the policy design parameters for this policy option, key and linked dimensions include:

   - **Level of Code Improvement:** Some Arizona jurisdictions have adopted International Energy Conservation Codes, and some have not.
   - **Code Coverage:** All buildings will be covered. Consistent with present practice, manufactured homes will continue to be covered by the same codes as other residences.
   - **Code Enforcement**: Compliance with codes will be enforced by local building inspectors. Inspectors need to be properly trained in new elements of the codes.

[6] Many of these suggestions are consistent with recommendations included in the WGA CDEAC EE report (for example, page 59).

- **Impact on low-income populations**: Code improvements should also cover low-income housing so as to reduce energy costs for residents of newly-constructed low-income units.

i. Implementation level(s) beyond BAU

ii. Timing of implementation

- Target adoption in 2007. Target in force in early 2008, but recognize that some municipalities in Arizona may implement later.

iii. Implementing parties

- Local Code Enforcement Agencies
- Metropolitan Associations of Government (to adopt codes for geographically adjoining areas in a coordinated fashion)
- Arizona Department of Commerce, through Code Commission, may play supporting role.

iv. Other

c) Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Information and education: Would include training and education programs and certification for building planners, builders/contractors, energy managers and operators, local officials, and others in the building industry, including training on building energy performance analysis tools and software. Would also include programs for consumer and elementary/secondary education.

ii. Training and technical assistance for code enforcement officials, including training and assistance in the use of building energy performance analysis tools and software, and in the review and analysis of the outputs of building energy performance tools.

iii. Funding mechanisms and or incentives: Utility programs (designed to encourage building energy performance beyond codes) may help to provide financial assistance for training code officials in the application of building energy codes. Increases in permit fees and/or increase in "impact fees" may also be considered to assist with funding of training for code officials.

iv. Voluntary and or negotiated agreements: Agreements within Metropolitan Area Government councils to collaborate on building energy codes in order to make compliance easier for building contractors and other building trade professionals.

v. Codes and standards—In addition to adoption of state and/or local and/or metropolitan area building energy performance codes, Arizona may

consider starting a State Building Energy Codes Collaborative process and/or joining a Regional Building Codes Collaborative, as referenced (for example) on pages 65-66 of the WGA CDEAC EE report.

vi. Market based mechanisms

vii. Pilots and demos

viii. Research and development

ix. Reporting

x. Registry

xi. Other?

2. BAU Policies/Programs, if applicable:

a) Code changes advanced in some localities, beginning in others. Most urban areas have adopted the IECC 2004 codes, and some (notably Tucson) have adopted more stringent codes.

3. Types(s) of GHG Benefit(s):

a) CO_2: Reduction from avoided electricity production and avoided on-site fuel combustion.

b) CH_4: Reduction in emissions from avoided fuel combustion and avoided natural gas pipeline leakage (modest impact).

c) N_2O: Reduction in emissions from avoided fuel combustion, but likely relatively small.

d) HFCs, SFCs: Likely not applicable unless specifically covered by codes.

e) Black Carbon: Possible reduction in emissions from avoided fuel combustion, but likely relatively small.

4. Types of Ancillary Benefits and or Costs, if applicable[7]:

a) Saving consumers and businesses money on their energy bills

b) Potential to also yield water savings

c) Comfort/indoor air quality improvements, with related improvements in health and productivity

d) Reducing dependence on imported fuel sources, and reducing vulnerability to energy price spikes

[7] Many of these ancillary benefits are adapted from those listed on page 2 of the WGA CDEAC EE report.

e) Electricity system benefits: reduced peak demand, reduced capital and operating costs, improved utilization and performance of the electricity system, reduced pollutant emissions from power plants and related public health improvements

f) Supporting local businesses and stimulating economic development

5. Estimated GHG Savings and Costs Per $MMTCO_2e$:

   a) Summary Table of:

      i. GHG potential in 2010, 2020

      ii. Net Cost per $MMTCO_2e$ in 2010, 2020

   b) Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:

   a) Data Sources

      - US DOE Building Energy Survey and related documents
      - *[State-level building activity/building stock statistics?]*
      - *[References on current building practices in Arizona?]*

   b) Quantification Methods

      - *[Parameterize existing studies (which ones?) of building energy performance?]*

   c) Key Assumptions

      - Note that results of any statewide code adoption will be different in different parts of the state, due to varying weather regimes.

7. Key Uncertainties if applicable:

   a) Benefits

   b) Costs

8. Description of Ancillary Benefits and Costs, if applicable:

   a) Description of issue #1

   b) Description issue #2

   c) Etc.

9. Description of Feasibility Issues, if applicable:
    a) Description of issue #1
    b) Description of issue #2
    c) Etc.

10. Status of Group Approval:
    a) Pending
    b) Completed

11. Level of Group Support:
    a) Unanimous Consent
    b) Supermajority
    c) Majority
    d) Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a) Description of barrier #1
    b) Description of barrier #2
    c) Etc.

Policy Option: RCI-5 -- "Beyond Code" Building Design Incentives and Programs: *Long List Item 5.1 with 4.2, 6.1, 6.2 as Supporting Policies*

1. Policy Description:

   a. Lay description of proposed policy action:

   Building energy performance standards should be promoted and implemented in State-funded and other (such as local) government buildings such that new buildings achieve high standards of energy efficiency, and existing buildings are renovated or retrofitted to yield significant energy efficiency improvements. Implementation of LEED (Leadership in Energy and Environmental Design) standards/certifications and/or other "green building" certifications and/or measured or modeled building energy performance criteria may be used. Implementation of white roofs, rooftop gardens, and landscaping (including shade tree programs would also be covered by this policy. In addition to directly influencing energy use in state-funded and government buildings, this policy will help to raise awareness of energy-efficiency improvement methods in building construction and operation, and will help to "drive" such improvements in other market segments. Policies to promote and implement similar energy performance enhancements in non-government buildings (new and existing) should also be implemented[8].

   - Establish a performance standard for state-owned or state-leased buildings to demonstrate the feasibility of not only achieving the minimum code requirements but exceeding them. This will demonstrate and encourage the use of advanced energy efficiency products and designs, and will also reward the states with the inherent benefits of more efficient buildings. New state-owned or state-leased buildings will be required to use at least *10 percent* less energy per square foot of floorspace relative to what the same building would have used if designed to just meet existing energy codes (that is, whatever codes are in force at the time the building is designed and constructed).
   - Require that state-owned or leased facilities use life-cycle costing, including full consideration of future energy costs, in the selection and implementation of building designs and components for both new and renovated space, or for the selection of replacement components. Further, following life-cycle cost analysis, require that the most cost-effective design/equipment/component options be chosen.
   - Provide financial or tax incentive for non-pubic and non-state public buildings (such as municipal buildings) to improve their energy performance beyond that required by existing codes[9]. Incentives should be provided for building

[8] Some of the elements below are consistent with or based on recommendations provided in the WGA CDEAC EE report (page 59).

[9] There are, as of the writing of this Policy Description, a number of ongoing discussions regarding the LEED certification program, other certification programs, and potential

projects (new, renovated, or remodeled space) where energy consumption per unit floor area is at least *10 percent* less that would be the case if the project just met existing codes. Incentives should be structured so that projects that produce higher savings per unit floor area relative to just meeting code requirements receive greater incentives

b. Policy Design Parameters:

In fleshing out the policy design parameters for this policy option, key and linked dimensions include:

- **Level of Improvement:** At least 10 percent relative to buildings meeting codes in force.
- **Coverage:** All building classes, but with state-owned or state-leased facilities covered by mandatory elements above, and all other buildings covered by voluntary elements.
- **Enforcement**: *State Agencies [WHICH ONES?] for state owned/leased space, Building Code Inspectors and [WHO WILL CERTIFY THAT A PROJECT HAS EXCEEDED CODE ENERGY PERFORMANCE, AND TO WHAT DEGREE?] for other buildings.*
- **Impact on low-income populations**: *Low income populations living in buildings covered by the policy will benefit through lower annual energy costs.*

i. Implementation level(s) beyond BAU

ii. Timing of implementation

- *Adoption in [year]? In force starting in [year]? [VOLUNTEERS—PLEASE INDICATE YOUR CHOICE HERE]*

iii. Implementing parties

- *Arizona State Agencies*
- *Others?*

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Information and education: Would include training and education programs and certification for state officials, building planners, builders/contractors, energy managers and operators, and local officials on

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performance guidelines for new and renovated buildings, and as a result, it is not yet clear which certifications or performance guidelines might be adopted or suggested for use in this program. Whichever set of certifications/performance guidelines are adopted should provide designers, builders and contractors with a means to advertise that their work meets a high energy-efficiency standard (through a specific labeling or certification), while also assuring that the actual energy performance of the building significantly exceeds the level required by codes.

certification that buildings and building subsystems have met program requirements. Would also include programs for consumer and elementary/secondary education.

ii. Technical assistance: Assistance to building planners, engineers, and others in energy-efficient design and in building energy efficiency analysis, possibly including reference materials, performance/design guidelines, and assistance with energy performance analysis software.

iii. Funding mechanisms and or incentives: Tax credits and/or incentives related to the rate of amortization of expenses related to buildings or renovation. State grants to help cover additional costs of energy performance enhancements for municipal government buildings.

iv. Voluntary and or negotiated agreements: Agreements by municipal governments, builders to meet higher energy performance standards in exchange for special certification and/or financial incentives.

v. Codes and standards: For state-owned or state-leased space, requirements to exceed codes in force as noted above.

vi. Market based mechanisms

vii. Pilots and demos: Applications of building energy performance improvements (possibly including demonstration of construction of buildings to LEED or other relevant standards) and urban landscaping for government buildings.

viii. Research and development

ix. Reporting

x. Registry

xi. Other?

2. BAU Policies/Programs, if applicable ***[NOTE THAT MANY OF THE STATE PROGRAMS LISTED BELOW ARE EITHER VERY RECENTLY ENACTED OR CURRENTLY UNDER CONSIDERATION, AND THUS MAY EFFECTIVELY CONSTITUTE "NEW" STATE GHG POLICIES RATHER THAN "BAU" POLICIES]***:

   a. Related notes in early version of RCI TWG Policy Matrix: "Executive Order 2005-05 implementing renewable energy and energy efficiency in new state buildings; Solar Design Standards for State Buildings; Tucson-Pima Sustainable Energy Program; City of Scottsdale Green Building program"

   b. Notes in early version of RCI TWG Policy Matrix related to professional education/certification: APS and state Energy Office offer building science training; APS subsidizes contractor training; Energy office provides training [in building codes]; · Technical assistance from Rebuild Arizona and Arizona Energy Office [for energy management/building operator training]

c. Newly-adopted Federal Energy Credit for houses "that reduce energy use for heating and cooling only (not hot water) by 50% compared to the national model code — the 2004 IECC Supplement", as well as for commercial buildings that "achieve a 50% reduction in annual energy cost to the user, compared to a base building defined by the industry standard ASHRAE/IESNA 90.1-2001"[10]

d. Legislation proposed as HB 2858 including a LEED standard for schools, and including methods by which the degree to which schools meet the standard will be monitored.

e. Legislation proposed as HB 2430 emphasizing life-cycle costing.

f. Legislation proposed as HB 2429 for solar tax credits.

g. Legislation proposed as HB 2843 for tax credits for high-efficiency residential central air conditioners and ceiling fans (as well as clothes washers).

h. Legislation proposed as HB 2324 and recently enacted as ARS 34-451 setting energy efficiency standards for new and existing public buildings.

i. Etc.

3. Types(s) of GHG Benefit(s):

a. CO_2: Reduction from avoided electricity production and avoided on-site fuel combustion.

b. CH_4: Reduction in emissions from avoided fuel combustion and avoided natural gas pipeline leakage (modest impact).

c. N_2O: Reduction in emissions from avoided fuel combustion, but likely relatively small.

d. HFCs, SFCs: Likely not applicable unless specifically covered by modifications.

e. Black Carbon: Possible reduction in emissions from avoided fuel combustion, but likely relatively small.

4. Types of Ancillary Benefits and or Costs, if applicable[11]:

a. Potential to also yield water savings, comfort/indoor air quality improvements with related improvements in health and productivity, plus urban design, market transformation, and other benefits.

b. White roofs, rooftop gardens, and landscaping, if widely implemented, may have a favorable impact on local climate, for example, reducing nighttime

[10] As summarized in "EPAct 2005: TAX CREDIT OPPORTUNITIES FOR SOLAR AND ENERGY EFFICIENCY", http://www.fsec.ucf.edu/EPAct-05.htm#newhome.
[11] Many of these ancillary benefits are adapted from those listed on page 2 of the WGA CDEAC EE report.

temperatures, potentially allowing a further reduction in energy use for space cooling.

c. Saving consumers and businesses money on their energy bills

d. Reducing dependence on imported fuel sources, and reducing vulnerability to energy price spikes

e. Electricity system benefits: reduced peak demand, reduced capital and operating costs, improved utilization and performance of the electricity system, reduced pollutant emissions from power plants and related public health improvements

f. Supporting local businesses and stimulating economic development

g. *Others?*

5. Estimated GHG Savings and Costs Per $MMTCO_2e$:

   a. Summary Table of:

      i. GHG potential in 2010, 2020

      ii. Net Cost per $MMTCO_2e$ in 2010, 2020

   b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:

   c. Data Sources

      - US DOE Building Energy Survey and related documents
      - *[State and local government building activity/building stock statistics?]*
      - *[References on current building practices in Arizona?]*

   d. Quantification Methods

      - *[Parameterize existing studies (which ones?) of LEED building energy performance and/or of buildings exceeding IEEC 2004 codes?]*

   e. Key Assumptions

      - Average fractional savings relative to codes in force for new/renovated state-owned or state-leased space.
      - Fraction of non-state new/renovated buildings participating in increased building efficiency program, by year.
      - Average fractional savings relative to codes in force for non-state buildings participating in increased building efficiency program.

7. Key Uncertainties if applicable:

   a. Benefits

b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
    a. Description of issue #1
    b. Description issue #2
    c. Etc.

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

Policy Option: RCI-6 -- Distributed Generation/Combined Heat and Power:
Long List Items 8.1 and 8.2, with 6.1, 6.2, 8.3, elements of 10.1 as Supporting Policies

1. Policy Description:
    a. Lay description of proposed policy action:

    Distributed generation in the form of clean combined heat and power systems give electricity consumers the capability of generating electricity or mechanical power on-site to meet all or part of their own needs, sell power back to the grid, and, through capture of heat typically lost during power generation, meet on-site thermal needs (hot water, steam, space heat, or process heat) or cooling (for example, through application of absorption chillers)[12]. In so doing, distributed generation with combined heat and power (CHP) raises the overall efficiency with which fuel is used. A CHP unit can be approximately 70 percent or more efficient compared to a system that does not recover waste heat. Non-CHP units are typically less than 45 percent efficient[13]. In addition to improvements in the efficiency of fuel use, and related reduction in greenhouse gas emissions, expanded use of distributed CHP offers significant electricity system benefits (including avoided electricity transmission and distribution losses, and avoided requirements for electricity grid expansion). Policies to encourage the adoption of CHP include a combination of regulatory changes and possibly incentives for adoption of CHP systems.

    b. Policy Design Parameters:

    In fleshing out the policy design parameters for this policy option, key and linked dimensions include:

    - **Level of CHP adoption:** *[How will this set of policies increase the use of CHP relative to use under a BAU scenario?]*
    - **Coverage:** CHP systems of 10 MW or smaller (or of equivalent mechanical power) would be covered *[Though larger sizes could be considered]*

        i. Implementation level(s) beyond BAU

        ii. Timing of implementation

        - Policies in place by the end of 2006, and in force thereafter, with periodic review as needed..

        iii. Implementing parties

        - *Public Agencies (systems for state or other government buildings)*
        - *Arizona Corporation Commission? Arizona State Government?*

[12] Note that the CCAG suggested that this policy option could be expanded to include on-site electricity generation from waste heat.
[13] Includes in part text provided by the DEAA.

- *Others?*

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed *[Note that in the list of incentives below items ii., v., vi., and xi. (in that order) are considered of primary importance, while other mechanisms are considered of secondary importance]*

i. Information and education: Would include training and education programs and certification for building planners, builders/contractors, energy managers and operators, and state and local officials related to the incorporation of CHP into building plans/designs/operation. Would also include programs for consumer and elementary/secondary education.

ii. Technical assistance: Assistance in siting and planning CHP systems.

iii. Funding mechanisms and or incentives: A program similar to that offered in California with up to $500 per kW or equivalent incentives per horsepower (hp) of capacity is possible. Another possible financial incentive are production incentives as included in the proposed legislative bill (HB 2426) *[?]* of $0.015 per kWh or equivalent incentives per hp-hour.

iv. Voluntary and or negotiated agreements

v. Codes and standards: A national IEEE standard, IEEE #1547, has been adopted to facilitate DG installations. FERC has adopted a national interconnect standard for installation to transmission lines. A number of other states, including Texas, California, New Jersey, New York- have adopted interconnect standards to facilitate DG installation. A similar standard is needed in Arizona, and has recently been under discussion at the ACC[14].

vi. Market based mechanisms: Net metering, avoided-cost pricing rules, and/or other utility tariff policies that promote CHP.

vii. Pilots and demos: CHP systems in government buildings

viii. Research and development: Support for research on combined power and cooling systems most germane to Arizona

ix. Reporting

x. Registry

xi. Utility Planning: Include CHP as an element of resource planning for utilities

[14] Includes in part text provided by the DEAA.

2. BAU Policies/Programs, if applicable:
    a. Interconnection rules and similar topics are under discussion at the Arizona Corporation Commission (ACC).
    b. Example 2
    c. Etc.

3. Types(s) of GHG Benefit(s):
    a. CO_2: Reduction from avoided electricity production and avoided on-site fuel combustion less additional on-site CO_2 emissions from fuel used in CHP systems.
    b. CH_4: Reduction in emissions from avoided fuel combustion and avoided natural gas pipeline leakage, net of any additional on-site emissions or additional leakage from increased gas use (likely modest impact).
    c. N_2O: Reduction in emissions from avoided fuel combustion, net of any increased on-site emissions, but likely relatively small.
    d. HFCs, SFCs: Likely not applicable.
    e. Black Carbon: Possible reduction in emissions from net avoided fuel combustion, but likely relatively small.

4. Types of Ancillary Benefits and or Costs, if applicable[15]:
    a. Potential increased reliability of electricity supply for CHP hosts, increased flexibility of supply.
    b. Central-station powerplant cooling water savings
    c. Potential local air quality impacts (may be positive or negative)
    d. Saving consumers and businesses money on their energy bills
    e. Reducing dependence on imported fuel sources, and reducing vulnerability to energy price spikes
    f. Electricity (grid) system benefits: reduced peak demand, reduced capital and operating costs, improved utilization and performance of the electricity system, reduced pollutant emissions from power plants and related public health improvements
    g. Supporting local businesses (related to distributed generation/CHP sales, installation, and service) and stimulating economic development
    h. *Others?*

[15] Many of these ancillary benefits are adapted from those listed on page 2 of the WGA CDEAC Energy Efficiency Task Force report.

5. Estimated GHG Savings and Costs Per $MMTCO_2e$:
    a. Summary Table of:
        i. GHG potential in 2010, 2020
        ii. Net Cost per $MMTCO_2e$ in 2010, 2020
    b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:
    a. Data Sources
        - National, regional (*and statewide*) estimates of CHP potential
        - *[Estimates of heat and cooling energy use in potential CHP hosts in AZ?]*
    b. Quantification Methods
        - *[Use existing case studies (which ones?) of CHP application?]*
    c. Key Assumptions

       Impact of suggested policies on uptake of CHP in Arizona.

7. Key Uncertainties if applicable:
    a. Benefits
    b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:
    a. Description of issue #1
    b. Description issue #2
    c. Etc.

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

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Policy Option: RCI-7 -- Distributed Generation/Renewable Energy Applications: *Long list Item 9.1, with 6.1, 6.2, 8.3, elements of 10.1 as Supporting Policies*

1. Policy Description:

   a. Lay description of proposed policy action:

   Customer-sited distributed generation powered by renewable energy sources provides electricity system benefits such as avoided capital investment and avoided transmission and distribution losses, while also displacing fossil-fueled generation and thus reducing greenhouse gas emissions. Customer-sited renewable distributed generation can include solar photovoltaic systems, wind power systems, biogas and landfill gas-fired systems, and systems fueled with biomass wastes or biomass collected or grown as fuel. Policies to encourage and accelerate the implementation of customer-sited renewable distributed generation include direct incentives for system purchase, market incentives related to the pricing of electricity output by renewable distributed generation, and state goals or directives. Non-electric renewable energy applications also covered by this policy include solar water heat and solar space heat and cooling.

   b. Policy Design Parameters:

   In fleshing out the policy design parameters for this policy option, key and linked dimensions include:

   - **Level of Implementation:** *[How will this set of policies increase the use of renewable customer-sited distributed generation (and direct use of solar heat) relative to use under a BAU scenario? If incentives in the form of capital cost rebates or above-wholesale electricity purchase rates are used, how and when should they be phased in/out?]*
   - **Coverage:** *[What types of systems should be included? All sizes/types, or just some?]*
   - **Impact on low-income populations**: *[How will the policy affect low-income populations? Can it be designed so as to offer direct benefit to these populations?]*

      i. Implementation level(s) beyond BAU

      ii. Timing of implementation

      - *Adoption in [year]? In force in [years]? Changes in rules in [years]?*

      iii. Implementing parties

      - Public Agencies (systems for state or other government buildings)

- Arizona Corporation Commission
- Arizona State Government
- Utilities

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed

i. Information and education: Would include training and education programs and certification for building planners, builders/contractors, energy managers and operators, renewable energy contractors, and state and local officials on the incorporation of distributed renewable generation and solar space/water heat in building projects. Would also include programs for consumer and elementary/secondary education.

ii. Technical assistance: Assistance in siting, designing, planning renewable systems

iii. Funding mechanisms and or incentives: *[Low-interest loan programs? Rebates on capital costs? Tax incentives? Attractive rates for power purchases/net metering? Other incentives?]*

iv. Voluntary and or negotiated agreements

v. Codes and standards: Common interconnection rules and standards are needed. A national IEEE standard, IEEE #1547, has been adopted to facilitate DG installations. FERC has adopted a national standard interconnect standard for installation to transmission lines. In addition, States, including Texas, California, New Jersey, and New York, have adopted interconnect standards to facilitate DG installation[16].

vi. Market based mechanisms: *[Net metering for some renewable distributed generation systems, and avoided-cost pricing rules for others?]*

vii. Pilots and demos: *[Renewable systems in government buildings?]*

viii. Research and development: *[Support for development of distributed renewable generation systems most germane to Arizona?]*

ix. Reporting

x. Registry

xi. Regulatory: *Complete Environmental Portfolio Standard (EPS) process at the Arizona Corporation Commission, and complete Sustainable Energy process at the Salt River Project*[17].

[16] Includes in part text provided by the DEAA.
[17] Includes in part text provided by the DEAA.

2. BAU Policies/Programs, if applicable:
    a. Related notes in early version of RCI TWG Policy Matrix: "SRP Solarwise; TEP and UES Sunshare PV buydown; Solar and Wind Equipment Sales Tax Exemption; Solar and Wind Energy Systems Tax Credit"
    b. BAU Policy #2
    c. Etc.

3. Types(s) of GHG Benefit(s):
    a. CO_2: Reduction from avoided fossil-fueled electricity production and any avoided on-site fuel combustion (for example, for biomass-fueled generation or solar space/water heating systems).
    b. CH_4: Reduction in emissions from avoided fuel combustion in electricity generation and avoided natural gas pipeline leakage (modest impact).
    c. N_2O: Reduction in emissions from avoided fuel combustion in electricity generation, but likely relatively small.
    d. HFCs, SFCs: Likely not applicable.
    e. Black Carbon: Possible net reduction in emissions from avoided fuel combustion in electricity generation, but likely relatively small.

4. Types of Ancillary Benefits and or Costs, if applicable[18]:
    a. Increased flexibility of electricity supply for consumers hosting generation.
    b. Central-station powerplant cooling water savings
    c. Potential local air quality impacts (may be positive or negative, depending on technology)
    d. Saving consumers and businesses money on their energy bills (and/or offering a new income stream)
    e. Reducing dependence on imported fuel sources, and reducing vulnerability to energy price spikes
    f. Where waste biomass fuels are used, possible reduction in disposal cost, reduction in environmental impacts related to disposal
    g. Electricity (grid) system benefits: reduced peak demand, reduced capital and operating costs, improved utilization and performance of the electricity system, reduced pollutant emissions from power plants and related public health improvements

[18] Some of these ancillary benefits are adapted from those listed on page 2 of the WGA CDEAC Energy Efficiency Task Force report.

h. Supporting local businesses (related to renewable system sales, installation, and service, and possibly biomass fuel supply) and stimulating economic development

i. Others?

5. Estimated GHG Savings and Costs Per $MMTCO_2e$:

   a. Summary Table of:

      i. GHG potential in 2010, 2020

      ii. Net Cost per $MMTCO_2e$ in 2010, 2020

   b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:

   a. Data Sources

      - Regional or statewide estimates of consumer-sited renewable generation potential *[?]*

   b. Quantification Methods

      - *[Use/adapt existing case studies of renewable generation application and projected costs in AZ, regionally, nationally?]*

   c. Key Assumptions

      - Impact of suggested policies on uptake of consumer -sited renewable generation in Arizona
      - Future costs of renewable generation application

7. Key Uncertainties if applicable:

   a. Benefits

   b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:

   a. Description of issue #1

   b. Description issue #2

   c. Etc.

9. Description of Feasibility Issues, if applicable:

   a. Description of issue #1

b. Description of issue #2
c. Etc.

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

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Policy Option: RCI-8 -- Electricity Pricing Strategies*: Long List Item 10.1, with 8.3 as Supporting Policy*

1. Policy Description:
   a. Lay description of proposed policy action[19]:

      As with other energy and non-energy commodities, the pricing of electricity—including electricity from the grid used by consumers and electricity generated on the consumers' premises flowing to the grid—can have a significant impact on consumers' usage decisions. Proper and clear electricity tariffs and price signals can provide significant encouragement to distributed generation, energy conservation (in many forms), and reduction of electricity use during times of peak electricity demand. Creating such tariff structures may involve restructuring tariffs to provide incentives for peak demand reduction—for example, through implementation of time-of-use energy charges—as well as setting net metering or other rules for sales from distributed generation to the grid that provide appropriate credit for the electricity generated during periods of high power demand.

   b. Policy Design Parameters:

      In fleshing out the policy design parameters for this policy option, key and linked dimensions include:

      - **Level of Implementation:** *[How will this set of policies help to increase the use of renewable customer-sited distributed generation and CHP relative to use under a BAU scenario?]*
      - **Coverage:** *[What types of consumers should be covered by pricing rules? All consumers, or just some?]*
      - **Impact on low-income populations**: *[How will the policy affect low-income populations? Can it be designed so as to offer direct benefit to these populations and/or provide relief for those negatively affected?]*

        i. Implementation level(s) beyond BAU

        ii. Timing of implementation

            - *Adoption in [year]? In force in [years]? Changes in rules in [years]?*

        iii. Implementing parties

            - Arizona Corporation Commission
            - Arizona State Government

[19] Portions of this description were adapted from text provided by the Distributed Energy Association of Arizona through TWG member Penny Allee Taylor.

- Utilities
- *Others?*

iv. Other

c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed a. *[Note that in the list of incentives below items xi., v., vi., and iii. (in that order) are considered of primary importance, while other mechanisms are considered of secondary importance]*

i. Information and education: Would include programs for consumer education, information for distributed generation hosts.

ii. Technical assistance: Assistance to consumers/potential distributed generation hosts in economic analysis of potential systems

iii. Funding mechanisms and or incentives: Pricing incentives/TOU pricing

iv. Voluntary and/or negotiated agreements

v. Codes and standards: Common interconnection rules and standards are needed. A national IEEE standard, IEEE #1547, has been adopted to facilitate DG installations. FERC has adopted a national interconnect standard for installation to transmission lines. In addition, several States, including Texas, California, New Jersey, and New York, have adopted interconnect standards to facilitate DG installation[20].

vi. Market based mechanisms: Net metering for some renewable distributed generation/CHP systems, avoided-cost pricing rules for others, TOU tariffs

vii. Pilots and demos: Pilot TOU rate implementation, and pilot renewable and CHP systems in government buildings, with tracking of costs/income

viii. Research and development: Support for development of electricity pricing systems

ix. Reporting

x. Registry

xi. Rate Designs: Incorporate new rate designs in current DG Workshops and upcoming APS rate case. Legislative action may be needed requiring new Salt River Project standards be implemented.

2. <u>BAU Policies/Programs, if applicable:</u>

a. Notes in early version of RCI TWG Policy Matrix related to TOU pricing: "APS Commercial Peak Reduction Campaign"

[20] Portions of this description and that of item "xi." were adapted from text provided by the Distributed Energy Association of Arizona through TWG member Penny Allee Taylor.

b. BAU Policy #2

c. Etc.

3. Types(s) of GHG Benefit(s):

   a. CO_2: Reduction from avoided fossil-fueled electricity production net of any additional on-site fuel combustion (for example, for CHP systems). TOU rates will affect emissions from different generators—whether a net reduction or increase in CO_2 emissions will occur remains to be determined.

   b. CH_4: Reduction in emissions from avoided fuel combustion in electricity generation and avoided natural gas pipeline leakage, net of additional on-site consumption (modest impact).

   c. N_2O: Reduction in emissions from avoided fuel combustion in electricity generation, net of additional emissions from consumer-sited fuel use in CHP or biomass-fired systems, but likely relatively small.

   d. HFCs, SFCs: Likely not applicable.

   e. Black Carbon: Possible reduction in emissions from avoided fuel combustion in electricity generation, net of additional emissions from consumer-sited fuel use in CHP or biomass-fired systems, but likely relatively small.

4. Types of Ancillary Benefits and or Costs, if applicable[21]:

   a. Increased flexibility of electricity supply for consumers hosting generation.

   b. Central-station powerplant cooling water savings

   c. Potential local air quality impacts (may be positive or negative, depending on technology)

   d. For pricing that induces new distributed generation, saving consumers and businesses money on their energy bills (and/or offering a new income stream)

   e. Reducing dependence on imported fuel sources, and reducing vulnerability to energy price spikes

   f. Where waste biomass fuels are used, possible reduction in disposal cost, reduction in environmental impacts related to disposal

   g. Electricity (grid) system benefits: reduced peak demand, reduced capital and operating costs, improved utilization and performance of the electricity system, reduced pollutant emissions from power plants and related public health improvements

[21] Some of these ancillary benefits are adapted from those listed on page 2 of the WGA CDEAC Energy Efficiency Task Force report.

h. Supporting local businesses (related to renewable system sales, installation, and service, and possibly biomass fuel supply) and stimulating economic development

i. Others?

5. Estimated GHG Savings and Costs Per $MMTCO_2e$:

   a. Summary Table of:

      i. GHG potential in 2010, 2020

      ii. Net Cost per $MMTCO_2e$ in 2010, 2020

   b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:

   a. Data Sources

      - Regional or statewide estimates of consumer-sited CHP and renewable generation potential *[?]*
      - Case studies of the impacts of TOU rates on load shapes *[?]*

   b. Quantification Methods

      - *[Note that for this option we may consider whether or not to do a separate analysis of GHG savings from net metering and interconnection rules, since most savings would come as a result of the impact of pricing strategies on other options, such as CHP and renewable distributed generation. The net impacts of TOU rates may be positive or negative, and probably should be assessed separately. Any net costs (or benefits) of the options included here should be captured, however, and might be added to the costs of RCI6 and RCI7 as they represent costs of policies that enable the savings provided by RCI6 and RCI7?]*

   c. Key Assumptions

      - Impact of suggested policies on uptake of consumer -sited CHP and renewable generation in Arizona
      - Impact of TOU rates on utility load curves.

7. Key Uncertainties if applicable:

   a. Benefits

   b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:

   a. Description of issue #1

b. Description issue #2
c. Etc.

9. Description of Feasibility Issues, if applicable:
    a. Description of issue #1
    b. Description of issue #2
    c. Etc.

10. Status of Group Approval:
    a. Pending
    b. Completed

11. Level of Group Support:
    a. Unanimous Consent
    b. Supermajority
    c. Majority
    d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):
    a. Description of barrier #1
    b. Description of barrier #2
    c. Etc.

Policy Option: RCI-9 -- Mitigating High GWP Gas Emissions (HFC, PFC); Specifications for New Commercial Refrigeration Equipment

1) Policy Description:

a) Lay description of proposed policy action:
Based on the current AZ emissions inventory and projection, GHG emissions from hydroflurocarbons (HFCs) could grow from about 1 MMtCO2e or <1% of Arizona GHG emissions in 2000 to over 7 MMtCO2e or about 5% of state emissions by 2020. Most HFC emissions are expected to result from leaks in mobile air conditioning and refrigeration applications.

Other sources of high GWP gases, which include the emission of perfluorocarbons (PFCs) and HFCs and from semiconductor manufacture and leakage of sulfur hexafluoride (SF6) from electricity distribution equipment, contribute less to state emissions, and these emissions are expected to decline based on existing emission reduction efforts, such as the semiconductor industry's voluntary worldwide agreement.[22]

Based on a review of available options to further reduce high GWP gas emissions in the RCI sectors, the TWG suggests further consideration of specifications for new commercial refrigeration equipment. Such specifications would: a) promote the use of low GWP refrigerants[23] in refrigerators in retail food stores, restaurants, and refrigerated transport vehicles (trucks and railcars); and/or b) require or provide incentives that centralized systems with large refrigerant charges and long distribution lines be avoided in favor of systems that use much less refrigerant and lack long distribution lines. These types of specifications are presently under consideration by the California Environmental Protection Agency.[24]

While a focus on commercial refrigeration emerged from TWG discussions, participants also noted that maintaining momentum of voluntary industry-government partnerships (such as the semi-conductor industry agreement) should be a high priority.

b) Policy Design Parameters: The following design parameters can specified as this option is further investigated.

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[22] *TIM – Could you provide a couple sentences to describe the voluntary agreement and expected emissions benefits for AZ*?

[23] Examples include lower GWP HFCs, carbon dioxide, and hydrocarbons (HCs - propane or isobutene/propane blend).

[24] California Environmental Protection Agency, *Climate Action Team Report to the Governor and Legislature*, December 8, 2005 Draft. The CCS team will be following up with CA Air Resources Board staff on their ongoing analysis and development of this option.

i) Implementation level(s) beyond BAU

ii) Timing of implementation

iii) Implementing parties

iv) Other

c) Implementation Mechanism(s): These could consist of hybrid approach, combining market-based incentives and codes and standards (specifications).

2) BAU Policies/Programs:

a) The Intel voluntary agreement noted above is producing significant reductions in PFC emissions from semiconductor manufacturing.

b) We are not aware of any active policies and programs related to commercial refrigeration.

3) Types(s) of GHG Benefit(s): This policy option would directly reduce HFC emissions. There is a possible rebound effect if substitute refrigerants are used and are less energy-efficient.

4) Types of Ancillary Benefits and or Costs, if applicable:

a) None yet specified.

5) Estimated GHG Savings and Costs Per $MMTCO_2e$ and 6) Data Sources, Methods and Assumptions

Direct estimates of state-level HFC emissions from commercial refrigeration are not available, but emissions can be roughly estimated from USEPA reports and emissions factors. Emission reduction estimates can be drawn from various sources, including US EPA studies[25] and in consultation with California EPA staff.

[25] See, for example, US EPA 2001, *U.S. High GWP Gas Emissions 1990–2010: Inventories, Projections, and Opportunities for Reductions*, June 2001. EPA 000-F-97-000.

Policy Option: RCI-10—Demand-Side Fuel Switching: Promoting Solar Energy for Water Heating and Biofuels for Commercial and Industrial Applications

1) Policy Description:

a) Lay description of proposed policy action:

Reductions in greenhouse gas emissions can be achieved in the residential, commercial and industrial end-use sectors when consumers switch to the use of less carbon-intensive fuels to provide key energy services. Fuel switching opportunities can include using natural gas in the place of electricity for thermal end-uses, natural gas in the place of coal for key industrial end-uses, biomass fuels in the place of electricity or natural gas for thermal end-uses, and solar thermal energy in the place of electricity or natural gas for thermal end-uses.

The TWG suggests the two following options to explore:

- The promotion of solar water heating through a combination of incentives and targeted research. These would build on existing incentives that already exist in the state.
- The substitution of biofuels for diesel and gasoline use in commercial and industrial equipment. Inventory estimates suggest that diesel[26] and gasoline use in commercial and industrial sectors comprised nearly 3% of the state's emissions in 2003 (2.7 million $MMtCO_2$), thus the potential for emissions reductions could be quite significant.

b) Policy Design Parameters: The following design parameters will specified as this option is further investigated.

(i) Implementation level(s) beyond BAU

(ii) Timing of implementation

(iii) Implementing parties

(iv) Other

c) Implementation Mechanism(s): The following mechanisms could be implicated.

(i) Further tax or other financial incentives for solar water heating systems (see BAU policies).

(ii) Targeted research at Arizona universities and research institutions to develop new and more cost-effective solar water heating technologies.

(iii) Policies to promote the uptake of biofuels in commercial and industrial applications (See Transportation TWG)

2) BAU Policies/Programs, if applicable:

[26] This includes distillate oil which is quite similar to

a) Arizona's Solar Energy Credit provides an individual taxpayer with a credit for installing a solar or wind energy device at the taxpayer's Arizona residence. The credit is allowed against the taxpayer's personal income tax in the amount of 25% of the cost of a solar or wind energy device, with a $1,000 maximum allowable limit, regardless of the number of energy devices installed.

b) Arizona provides a sales tax exemption for the sale or installation of "solar energy devices". A solar energy retailer may exclude from tax up to $5,000 from the sale of each solar energy device, and a solar energy contractor may exclude up to $5,000 of income derived from a contract to provide and install a solar energy device.

3) Types(s) of GHG Benefit(s): Solar water heating will avoid CO2 emissions from displaced fuel use (e.g. gas) or electricity generation. Biofuels will avoid CO2 emissions from diesel and gasoline combustion; however, lifecycle emissions from the production of biofuels need to be considered, and these could involve N2O emissions from crop production. Other emissions impacts are likely to be relatively insignificant.

4) Types of Ancillary Benefits and or Costs, if applicable:

a) Potential local air pollution impacts (from switching from electricity to on-site fuels combustion, or from gas to other fuels)

b) Potential local and state economic co-benefits [including rural employment] from using local biomass fuel supplies and installation of solar water heating systems.

c) Biomass fuel supply/use may interact with land use, forestry, local air quality issues (from notes in the RCI TWG Policy Matrix).

5) Estimated GHG Savings and Costs Per MMTCO2e and 6) Data Sources, Methods and Assumptions:

Policy Option: RCI-11 - Industrial Sector GHG Emissions Trading or Commitments, *Long List Item 14.1*

1) Policy Description:

   a) Lay description of proposed policy action: Emissions cap and trade programs and/or voluntary emissions targets are options that have been considered for systematically addressing industrial sector GHG emissions. For example, a number of large industries (e.g. steel, cement) are included within the EU GHG Emission Trading System (ETS), and have been proposed for inclusion in national legislative proposals (e.g. McCain-Lieberman bill). Voluntary commitments have also been adopted within the US and internationally, exemplified by the US Climate Leaders program. This policy option specifically addresses how industrial sector sources would be addressed by trading systems and/or voluntary commitments.

   RCI TWG members feel that a regional or national cap and trade program approach would be preferable to a state level one. They feel that because the CCAG is a state-level advisory group, it may exceed the mandate of the CCAG to attempt development of a straw proposal; rather, the concept and design elements would be best developed by an institution at a regional level or national level. A recommendation for CCAG to consider is a request that the governor explore a regional cap and trade program in a regional forum and/or advocate for development of national program.

   b) Policy Design Parameters: See above.

      i) Implementation level(s) beyond BAU

      ii) Timing of implementation

      iii) Implementing parties

      iv) Other

   c) Implementation Mechanism(s):

2) BAU Policies/Programs: None.

3) Types(s) of GHG Benefit(s): Trading systems or commitments can include any or all gases (CO_2, CH_4, N_2O, HFCs, SFCs, Black Carbon) as noted above.

4) Types of Ancillary Benefits and or Costs, if applicable:

5) Estimated GHG Savings and Costs Per $MMTCO_2e$ and 6) Data Sources, Methods and Assumptions

Emission savings estimates for trading systems can be estimated from direct modeling studies or drawn from results of regional and national studies. For voluntary agreements, estimates can be drawn from experience in relevant industries.